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(54) A PARTITION ELEMENT

(71) I, JINICHI ITO, of No. 6—19, Mitsuyamoto-machi, Nagahama-shi, Shiga-ken, Japan, a Japanese citizen, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a partition element which can be used for forming a wall or a partition such as an internal partition or an outer wall of a building or an outdoor partition such as a fence, to a combination of such elements with connecting rods, and to a wall or partition including such elements.

As a conventional element for forming a wall or a partition, there is known a brick, which is available in various forms and materials. Furthermore, there are recently known various kinds of panel elements adapted to be assembled by a help of some reinforcing members such as steel rods inserted through hole spaces formed therein.

With respect to the conventional bricks, there is a drawback that it requires much of work to form or build a wall or a partition by laying up relatively small sized bricks with troublesome interposition of a joint material. Furthermore, brick-built walls or partitions are of low strength. On the other hand, the conventional panel elements adapted to be assembled by a help of some reinforcing members passed therethrough, there is a drawback that, if long reinforcing members are used in order to avoid connection of one reinforcing member to another during construction, the construction work becomes very difficult and requires special auxiliary equipment or machines to lift the elements up to the upper ends of the reinforcing members before the elements can be finally positioned, while if relatively short reinforcing members are used in the construction of a wall or partition it is troublesome to connect one reinforcing member to another to form a long reinforcing member as the elements are piled up one on another.

Furthermore, in the case of conventional bricks or panels which are adapted to define

the thickness of a wall or a partition by the thickness of themselves, the brick or panel has usually at least two other surfaces which do not serve to define the outer surfaces of the wall or the partition. Such surface portions are usually superfluous and merely increase the weight and cost of the brick or the panel.

According to one aspect of the present invention, I provide a partition element comprising a pair of substantially parallel rectangular plate members having vertical and horizontal edges, and at least two bridge members connecting said plate members and extending in the thickness of the element, said bridge members each having at least one pair of vertical through bores to receive vertical connecting rods and counterbores at each end of each through bore, and at least one pair of opposite edges of each said plate member being formed with complementary locating ridges and locating grooves, a locating groove on one edge being adapted to cooperate with a locating ridge on the opposite edge of a further partition element.

This partition element may be used for the construction of walls or partitions having high strength and rigidity, which nevertheless can be easily assembled. The element particularly lends itself to a design in which the minimum necessary amount of material is used. The disadvantages of conventional bricks and panels are thus mitigated or avoided.

The partition element of the invention is particularly designed for use with connecting rods of a length substantially equal to an integral multiple (preferably two) of the height of the elements (excluding the locating ridge or ridges). To form an interconnected assembly the rods are received in the vertical bores in the bridge members and are vertically staggered so that each element (except the topmost and bottommost ones) has extending through it at least one rod which extends upwardly of it into a vertical through bore of an element above and at least one rod which extends downwardly of it into a vertical through bore of an element

below. Suitable securing means received in the counterbores are provided at the ends of the rods, preferably an enlarged head at one end of the rod and a nut at the other, or nuts at both ends. (The use of the terms bore and counterbore does not mean that they must be formed by boring. Any suitable process may be employed).

According to the invention in other aspects there are therefore provided a combination of the partition element or elements of the invention with connecting rods and securing means as described above, and also a wall or partition formed from the elements assembled together as described above.

Said at least two bridge members are preferably provided as a pair, each being positioned a distance from the adjacent vertical edge of said plate member substantially equal to a quarter of the length of said plate member. Thus the two bridge members are each positioned along the length of the partition element and are spaced away from opposite ends of the plate members by a quarter of the length of the plate members, so that when the partition elements are closely arranged lengthwise and such a series of partition elements are piled up one onto the other in rows staggered horizontally by a half length of the partition element, the bridge member at a first end of a partition element in a first row aligns with the bridge member at a second end of a partition element in the next row, and thus interconnection between two adjacent partition elements in a row can be accomplished by connecting firmly the aligned bridge members by means of bolts passed through said through bores formed in the bridge members. In this case, since each bridge member is formed with at least a pair of through bores, there is always available at least one through bore for each pair of adjacent partition elements in adjacent rows, said bores being in alignment and ready to be penetrated together by a fastening bolt of a length just sufficient to fasten the adjacent two partition elements in adjacent two or more rows.

For every alternate row of the partition elements in such a partition, it is preferable to end the row with a special partition element which corresponds to a half section of a full length partition element (i.e. a partition element transversely divided into two equal parts) so as to compensate the lengthwise displacement of adjacent rows by a half of the partition element length and to provide a smooth end side of the wall or the partition.

When the partition elements provided with said complementary ridges and grooves are closely arranged lengthwise as well as piled up one on the other while keeping their orientation, the ridges and the grooves of the adjacent edges of the adjacent partition

the adjacent edges of the adjacent partition elements engage each other and a firmly built-up wall or partition is obtained.

The bridge members may preferably be formed with horizontal through openings, especially at their upper and lower edges to allow passage of miscellaneous utilities such as pipes and cables.

The bridge members may have one or more portions of reduced thickness and thereby be weakened so that any one of such portions can be readily broken to provide a horizontal through opening, when required. These removable portions may also be at the upper and/or lower edges of the bridge member. It is preferable that the locating ridge on at least one edge of the element is formed with an anti-capillary groove preferably extending along a root portion thereof. By providing such a side groove, the invasion of rain or water into the inside space of the partition elements through their engaging portions is effectively checked, because such invasion of water most occurs due to the capillary action and by the provision of an enlarged space or break formed by the groove, the progress of the water by capillary action is blocked.

In order that the invention may be clearly understood and readily carried into effect, some preferred embodiments thereof will now be described, by way of example only, with reference to the accompanying drawings, wherein:—

Fig. 1 is a perspective view of a first partition element embodying to the invention;

Fig. 2 is a perspective view of a specially prepared half sized element preferably used with the partition element shown in Fig. 1;

Fig. 3 is a section along line III—III in Fig. 1;

Fig. 4 is a section along line IV—IV in Fig. 1;

Fig. 5 is a perspective view of a wall or a partition embodying the invention made from a number of the partition elements shown in Figs. 1 and 2;

Fig. 6 is a section along line VI—VI in Fig. 5;

Fig. 7 is a section along line VII—VII in Fig. 5;

Fig. 8 is a view similar to Fig. 1 showing a modification modified partition element also embodying the invention;

Fig. 9 is a view similar to Fig. 2 showing a corresponding modified half-element;

Fig. 10 is a section along line X—X in Fig. 8;

Fig. 11 is a section along line XI—XI in Fig. 8;

Fig. 12 is a perspective view of a wall or a partition embodying the invention formed from a number of the partition elements shown in Figs. 8 and 9;

Fig. 13 is a partial front view of the wall or



the partition shown in Fig. 12 on an enlarged scale with a portion thereof broken away for the purpose of illustration;

Fig. 14 is a view similar to Fig. 1 or 8 showing a further partition element embodying the invention;

Fig. 15 is a view similar to Fig. 2 or 9 showing a corresponding modification of the half element shown in Fig. 2 or 9;

Fig. 16 is a section along line XVI—XVI in Fig. 14;

Fig. 17 is a partial view in vertical section of a wall or a partition embodying the invention formed of the elements shown in Figs. 14 and 15; and

Fig. 18 is a partial view in horizontal section of the wall or partition formed of the elements shown in Figs. 14 and 15.

Referring to the drawings, and to Fig. 1 in particular, a partition of Fig. 17 element 1 comprises a pair of parallel rectangular plate members 2 and a pair of bridge members 3, the latter firmly connecting said plate members. Each bridge member 3, which is also of plate shape, of a plate member, is arranged to be parallel to pairs of opposing vertical edges 4 of the plate members and is spaced away from the adjacent edge 4 by a quarter of the length of the plate member 2. Therefore, the pair of bridge members are spaced from each other by a half of the length of the plate member 2.

Each bridge member 3 is formed with two pairs of through bores 5 which extend therethrough and which are parallel to the edges 4 of the plate members 2 (Figs. 3 and 4). These pairs of through bores are arranged to be symmetrical with respect to the center of the partition element so that when the partition elements are piled one on the other with lengthwise displacement of a half of the length thereof, the through bores 5 of the bridge member provide adjacent a first end of a partition element strictly align with those of the bridge member provided adjacent a second end of another partition element.

The ends of the through bores 5 are formed with counterbores 6 adapted to receive bolt heads or nuts. The bridge member 3 is further formed with lateral through openings 7 and 8, of which the openings 7 are enclosed by solid wall portions of the bridge member, while the openings 8 are open at the upper and lower edge ends of the bridge member.

Each plate member 2 is formed with complementary ridges 9, 10 and grooves 11, 12 at respective opposite edges.

Fig. 2 shows a half sized element 13 which corresponds to just a half of the element shown in Fig. 1, and therefore, in Fig. 2, portions corresponding to those in Fig. 1 are designated by the same reference numerals.

By using the elements 1 and 13 as shown in Figs. 1 and 2, respectively, a wall or a parti-

tion can be built as shown in Figs. 5 to 7. In the construction of such a wall or partition a series of elements 1(a) and 13(a), if required, are first arranged to be in close contact with respective adjacent elements, wherein the ridge 10 of an element 1(a) is engaged with the groove 12 of an adjacent element 1(a). In this case, each element is preferably mounted beforehand with four bolts 14 each through one of each pair of the four pairs of through bores 5. Then, a series of elements 1(b) and 13(b), if required, are piled with horizontal staggering upon the first series of the elements, wherein the second series of elements are displaced by a half of the length of the element 1 and the bolts 14 extending upward from the first series of elements are introduced into and through the corresponding bores 5 of the second series of elements. In this case, it will also be noted that the ridges 9 of the first series of elements engage with the grooves 11 of the second series of elements to form a firm assembly. The bolts 14 are preferably formed to have a length just enough to extend through two elements piled up one on the other and to fasten each two elements firmly together. When the second series of elements are piled upon the first series of elements, each second element is preferably mounted beforehand with four other bolts 14 on through each of the other (unoccupied) bores of the four pairs of through bores 5. The heads of bolts or nuts are received in the counter-bores 6. Thus, the third, fourth and subsequent rows of elements are piled up, with the bolts vertically staggered (see Fig. 7).

In the abovementioned manner of construction, it will be noted that the bolts 14 never project more than the height of one element above the series of elements in the preceding row, whereby the construction work is very much simplified, because each next element to be piled upon has only to be lifted by the height of one element from the already constructed part of a wall or a partition.

Figs. 8 and 9 show a modification of the elements shown in Figs. 1 and 2, respectively, and therefore, portions corresponding to those shown in Figs. 1 and 2 are designated by the same reference numerals.

In these elements 15 and 16, portions 17 in the bridge member 3 corresponding to the lateral openings 7 and 8 are merely reduced in thickness to leave relatively thin portions which can readily be broken to provide openings when required.

The elements 15 and 16 as shown in Figs. 8 to 11 can be assembled in the same manner as the case of the elements 1 and 13 to form a wall or a partition as shown in Fig. 12. However, since in this case the bridge members 3 are originally formed with no opening, there are formed a number of pillar-shaped

spaces enclosed by the bridge members 3 and the plate members 2. Therefore, a reinforcement of a wall or partition formed by these elements can be readily accomplished by arranging some steel rods 18 in one of such spaces and pouring concrete 19 therein as shown in Figs. 12 and 13. In this case, if a pipe 20 is to be passed laterally, the corresponding reduced portions 17 are broken to allow passage of the pipe 20 and the setting of the concrete 19 is done after the pipe 20 has been properly positioned. Furthermore, additional reinforcing means such as a wire 21 wound around the steel rods 18 may be provided before the setting of the concrete.

Figs. 14 and 15 show a further modification of the elements shown in Figs. 1 and 2 or Figs. 8 and 9, respectively, and therefore, portions corresponding to those shown in Figs. 1 and 2 or 8 and 9 are again designated by the same reference numerals.

In these elements 22 and 23, the ridges 9 and 10 are formed with side grooves 24 and 25, respectively, extending along root portions thereof. When these partition elements have been assembled with their complementary ridges 9, 10 and grooves 11, 12 being engaged with each other, there are formed spaces which interrupt possible progress of the capillary action of a liquid, particularly water through clearances left between the adjacent elements as shown in Figs. 17 and 18. Thus, a wall or a partition formed of the elements 22 and 23 is highly resistive to humidity, and troubles which would be caused in the wall or the partition due to the humidity, such as electric leakage, corrosion of pipes, etc. are effectively avoided.

#### WHAT I CLAIM IS:—

1. A partition element comprising a pair of substantially parallel rectangular plate members having vertical and horizontal edges, and at least two bridge members connecting said plate members and extending in the thickness of the element, said bridge members each having at least one pair of vertical through bores to receive vertical connecting rods and counterbores at each end of each through bore, and at least one pair of opposite edges of each said plate member being formed with complementary locating ridges and locating grooves, a locating groove on one edge being adapted to cooperate with a locating ridge on the opposite edge of a further partition element.

2. A partition element according to Claim 1, wherein said bridge members are provided as a pair each being positioned a distance from the adjacent vertical edge of said plate member substantially equal to a quarter of the horizontal length of said plate member.

3. A partition element according to

Claim 1 or Claim 2, wherein each said bridge member is formed with one or more horizontal through openings.

4. A partition element according to any one of Claims 1 to 3, wherein each said bridge member is formed with one or more portions where the thickness is reduced with respect to surrounding portions, said portions being removable to provide horizontal through openings.

5. A partition element according to Claim 3 or Claim 4, wherein said through opening or openings or the portion or portions removable to provide a through opening or openings are at the top and/or bottom edges of the bridge members.

6. A partition element according to any one of the preceding claims wherein said locating ridges are provided with grooves arranged to provide anti-capillary breaks.

7. A partition element constructed and arranged substantially as herein described with particular reference to Figs. 1 to 7, 8 to 13, or 14 to 18 of the accompanying drawings.

8. A partition element or elements according to any one of the preceding claims in combination with connecting rods receivable in the said vertical through bores and of a length substantially equal to an integral multiple of the height of the element (excluding the locating ridge), and means receivable in said counterbores for securing the rods in the vertical through bores.

9. A combination according to Claim 8, wherein the said means for securing the rods are an enlarged head on one end of a rod and a nut for the other end, or a nut for each end of a rod.

10. A combination according to Claim 8 or Claim 9 wherein the rods are of a length substantially equal to twice the said height of the elements.

11. A wall or partition wherein a plurality of partition elements according to any one of claims 1 to 8 are assembled together by means of connecting rods of a length substantially equal to an integral multiple of the height of the elements (excluding the locating ridge) received in the said vertical through bores and secured at their ends by means received in said counterbores, the rods being vertically staggered so that each element (except the topmost and bottommost ones) has extending through it at least one rod which extends upwardly of it into a vertical through bore of an element above and at least one rod which extends downwardly of it into a vertical through bore of an element below.

12. A wall or partition according to Claim 11 wherein as the said securing means the rods have an enlarged head on one end and a nut on the other end, or a nut on each end.

13. A wall or partition according to Claim 11 or Claim 12, wherein the rods are of a length substantially equal to twice the said height of the elements.
- 5 14. A wall or partition according to any one of Claims 11 to 13, wherein the partition elements are horizontally staggered by half their horizontal length and half-elements having at least one said bridge member are
- 10 included in the assembly.
- 15 A wall or partition according to Claim 14 constructed substantially as herein described with reference to, and as shown in, Figs. 5 to 7 or Figs. 12 and 13 of the accompanying drawings.
- 15

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FIG. 1

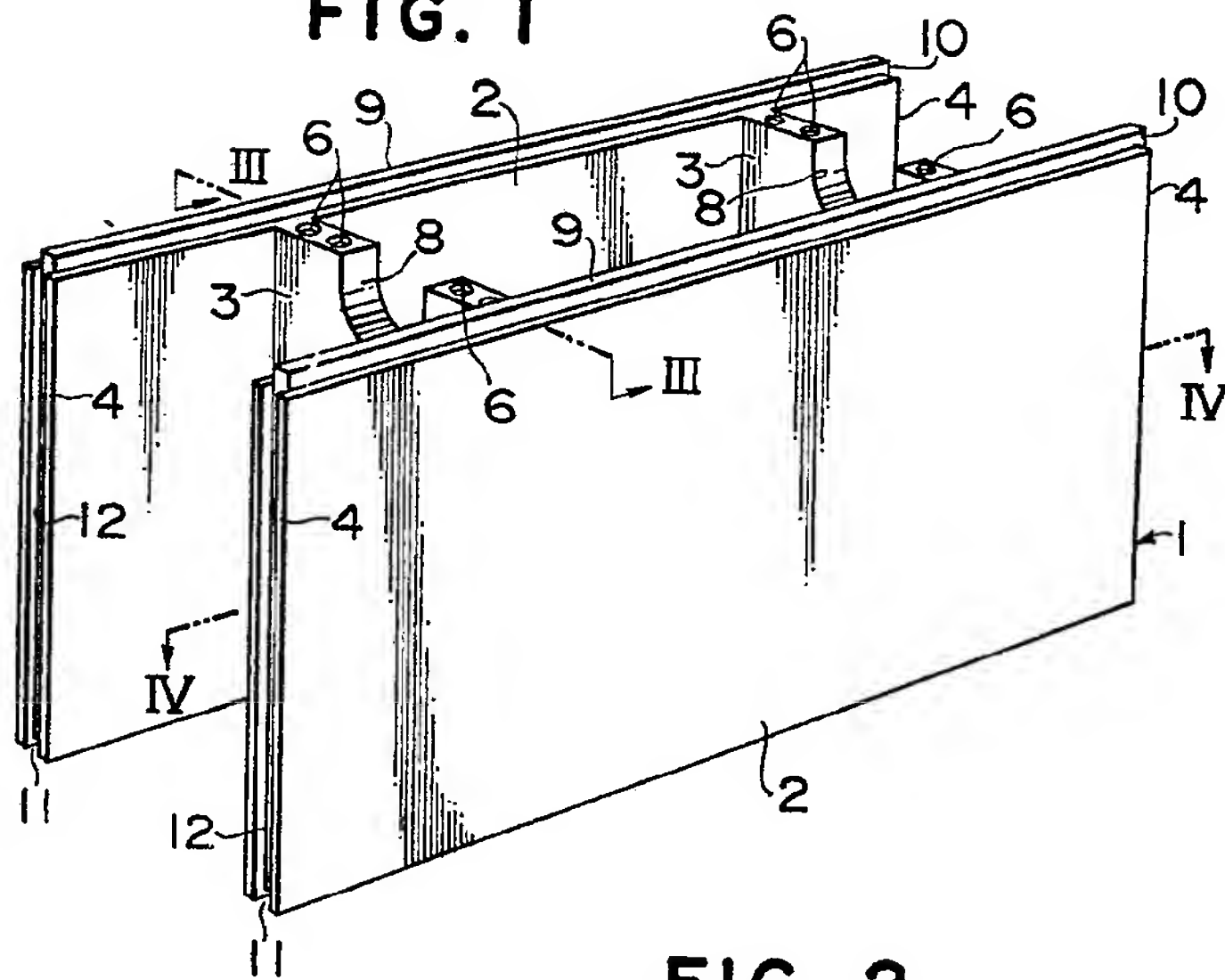
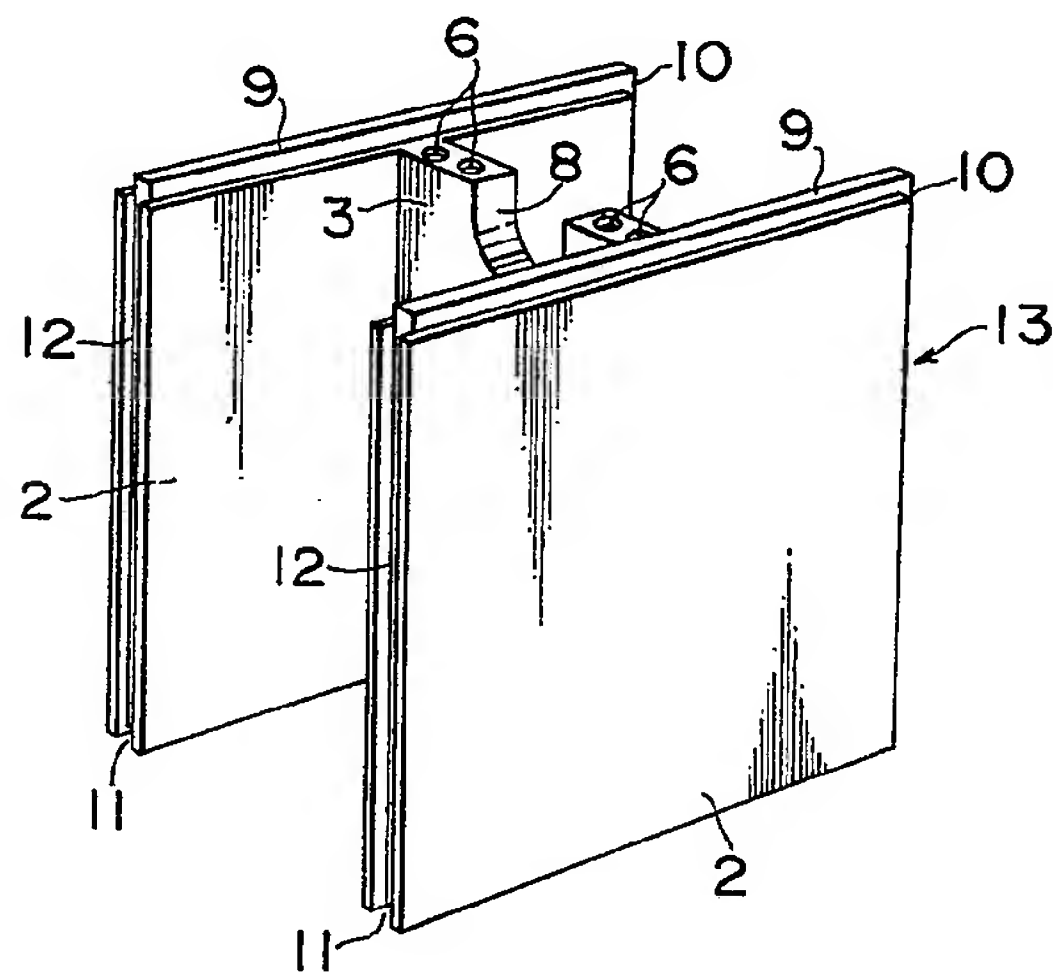
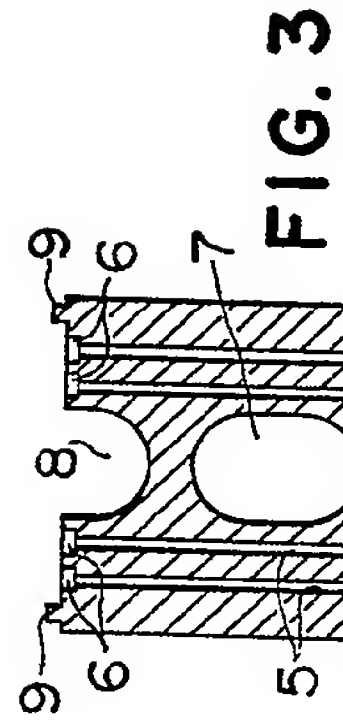


FIG. 2





**FIG. 4**

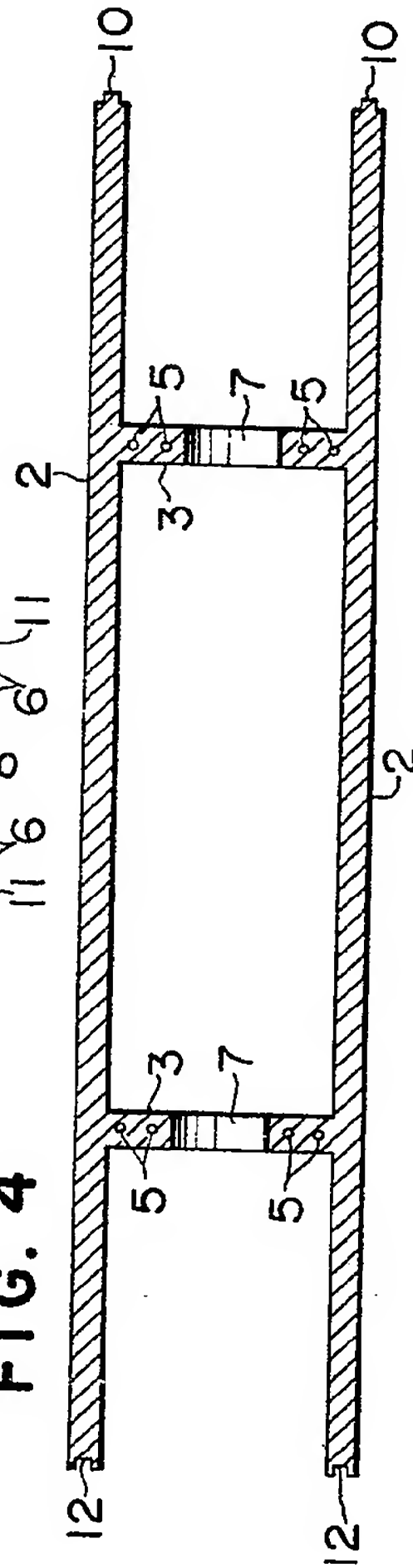


FIG. 5

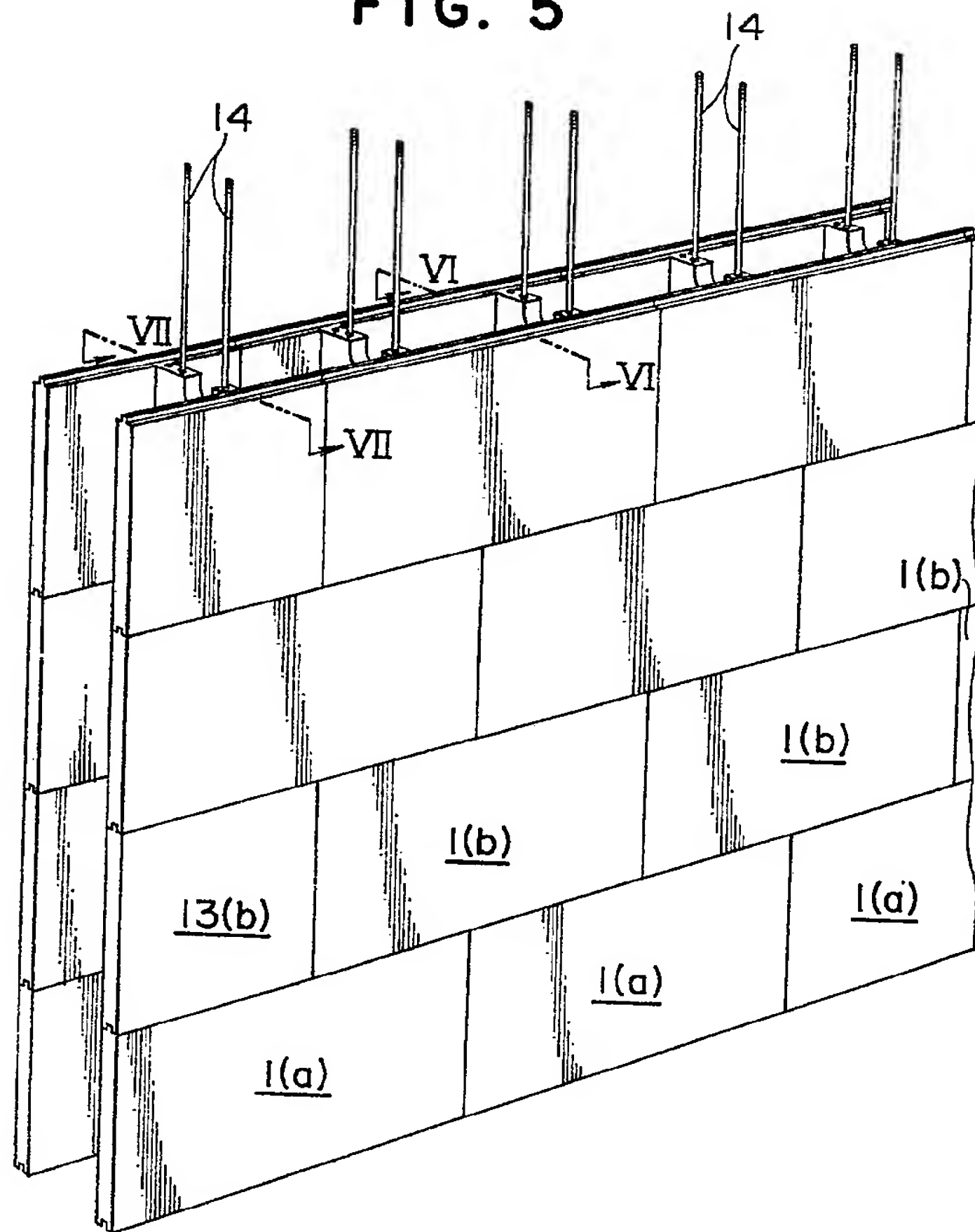




FIG. 7

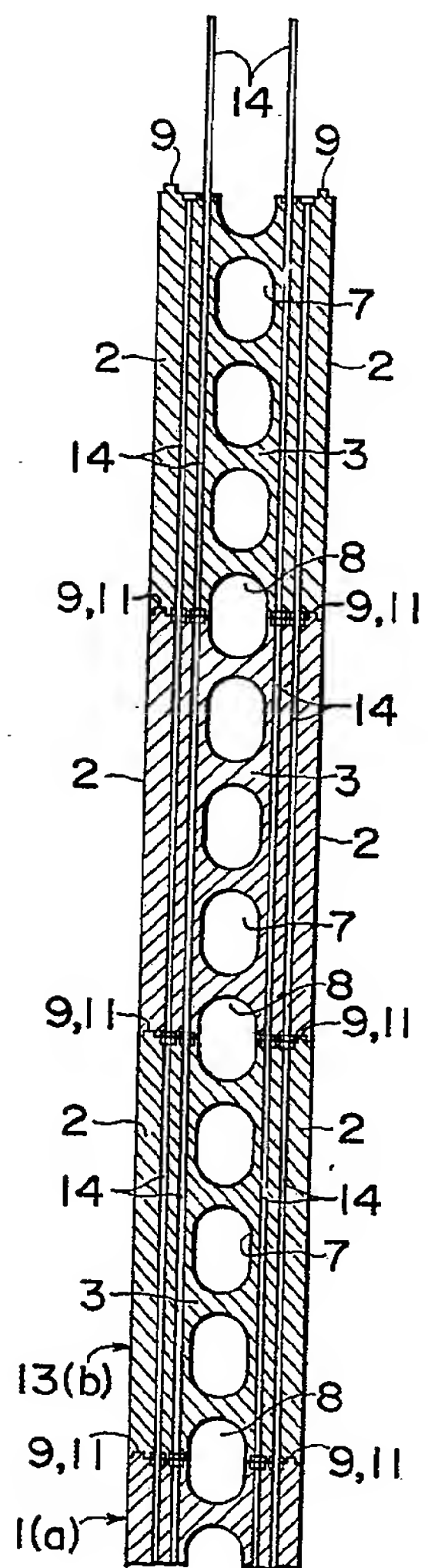


FIG. 6

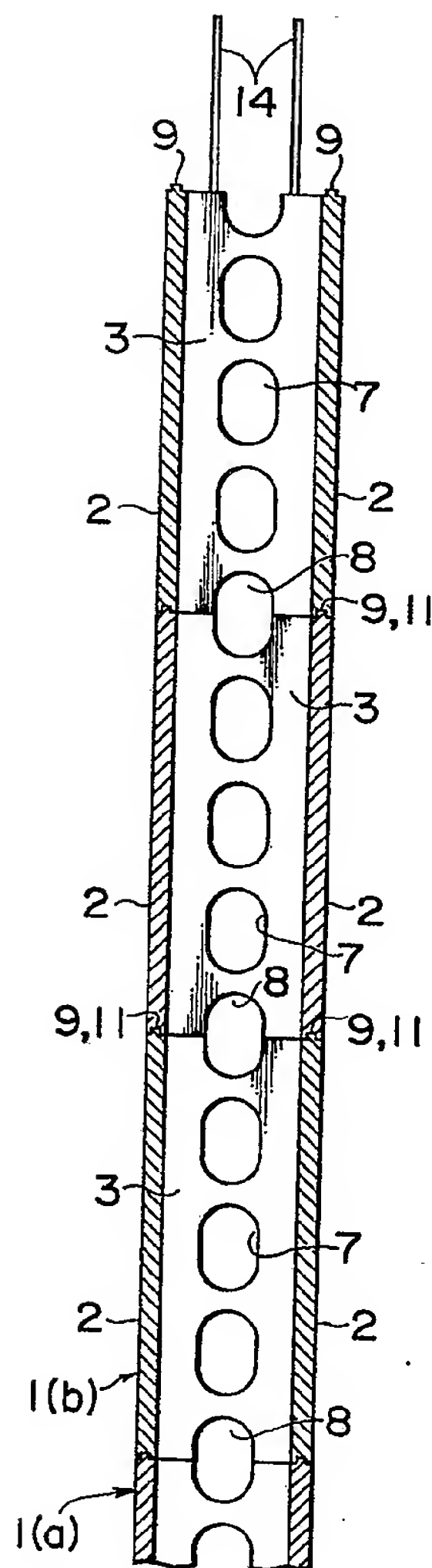


FIG. 8

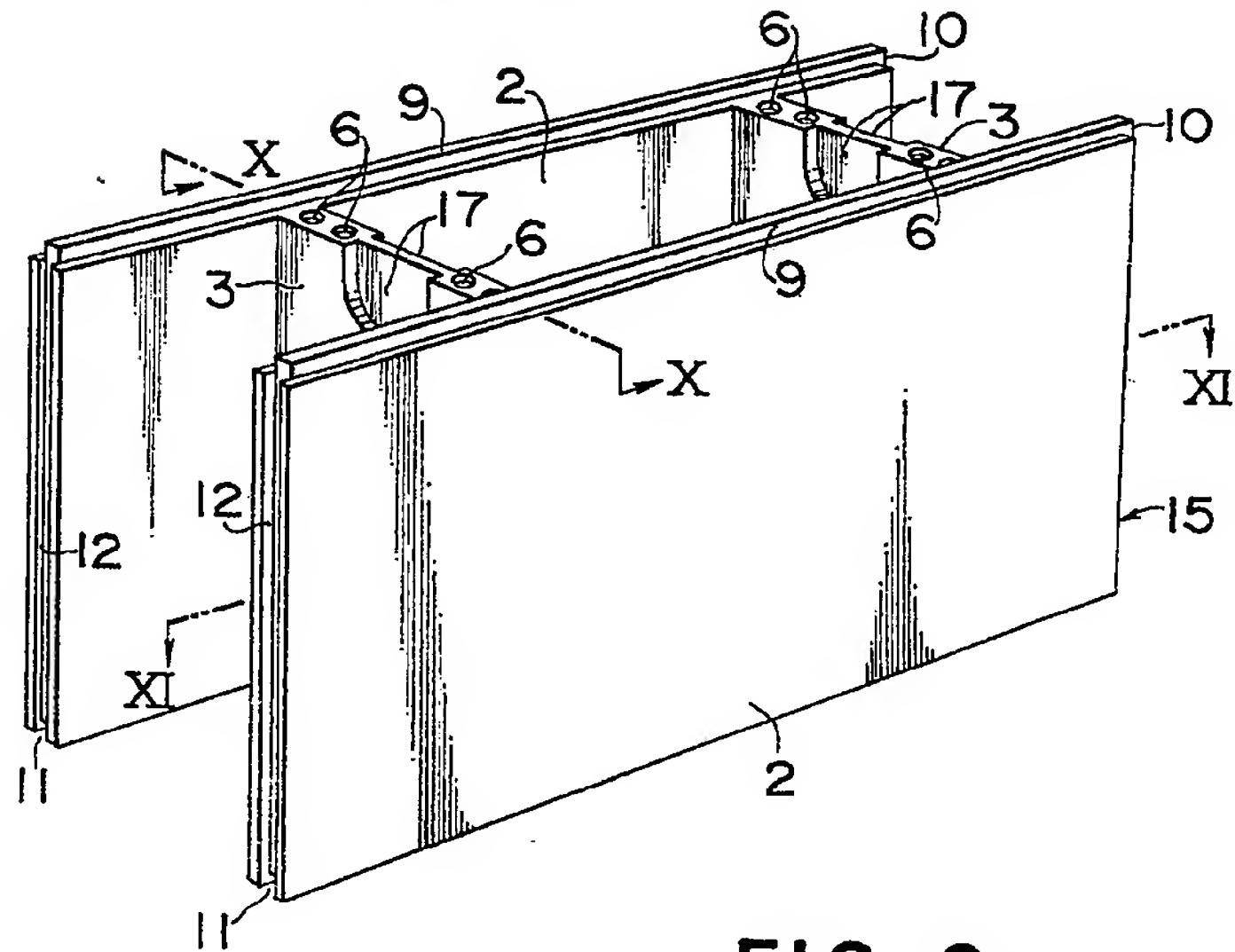
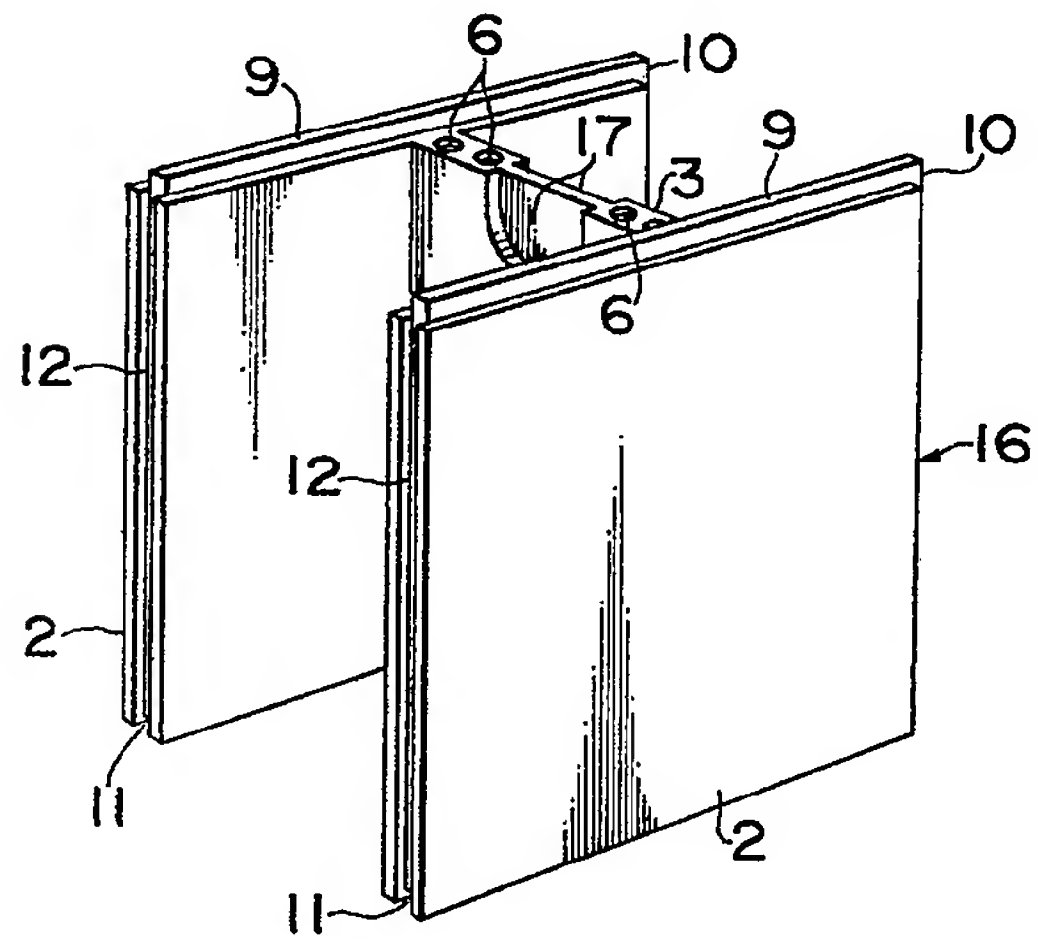


FIG. 9



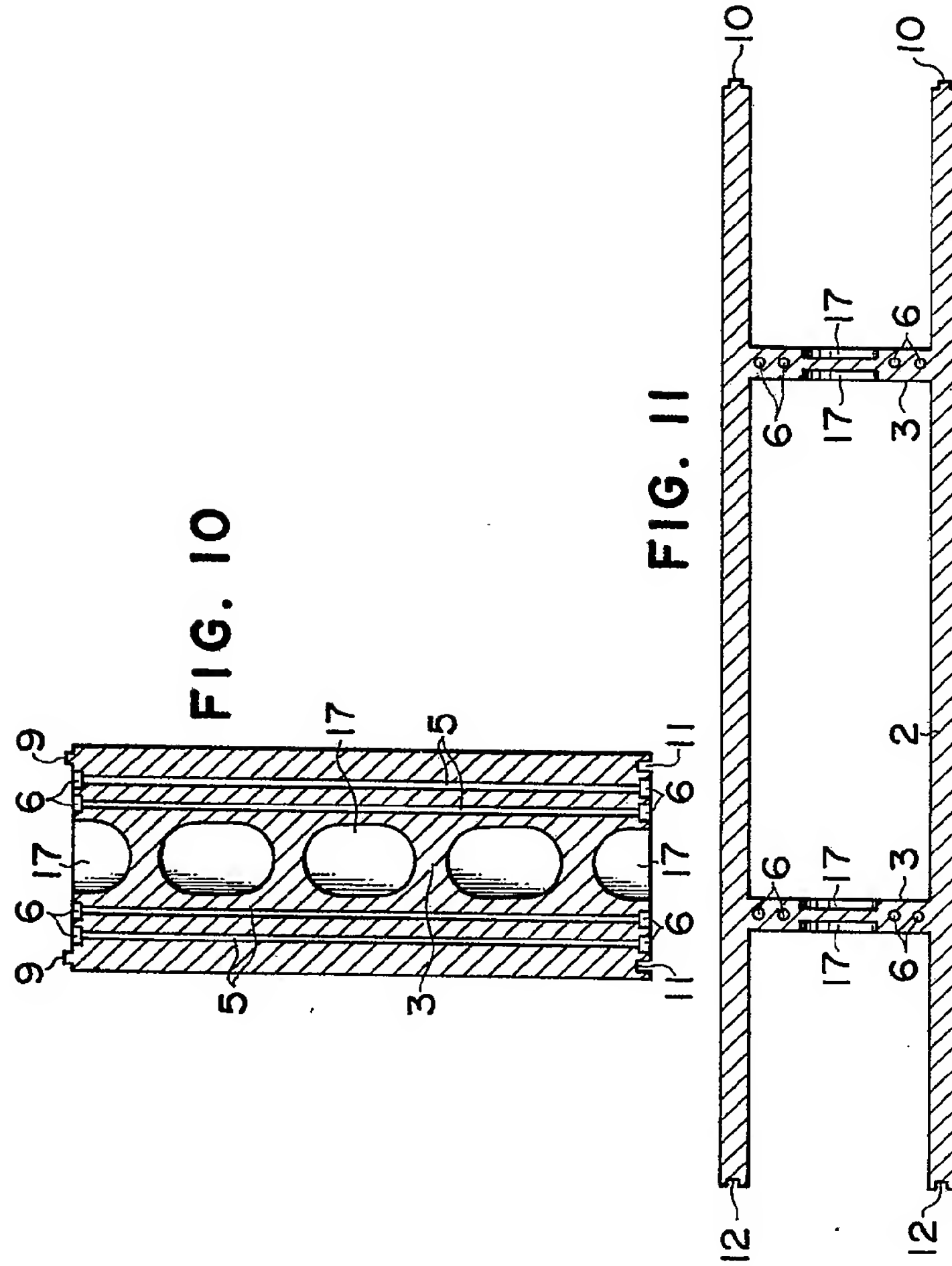
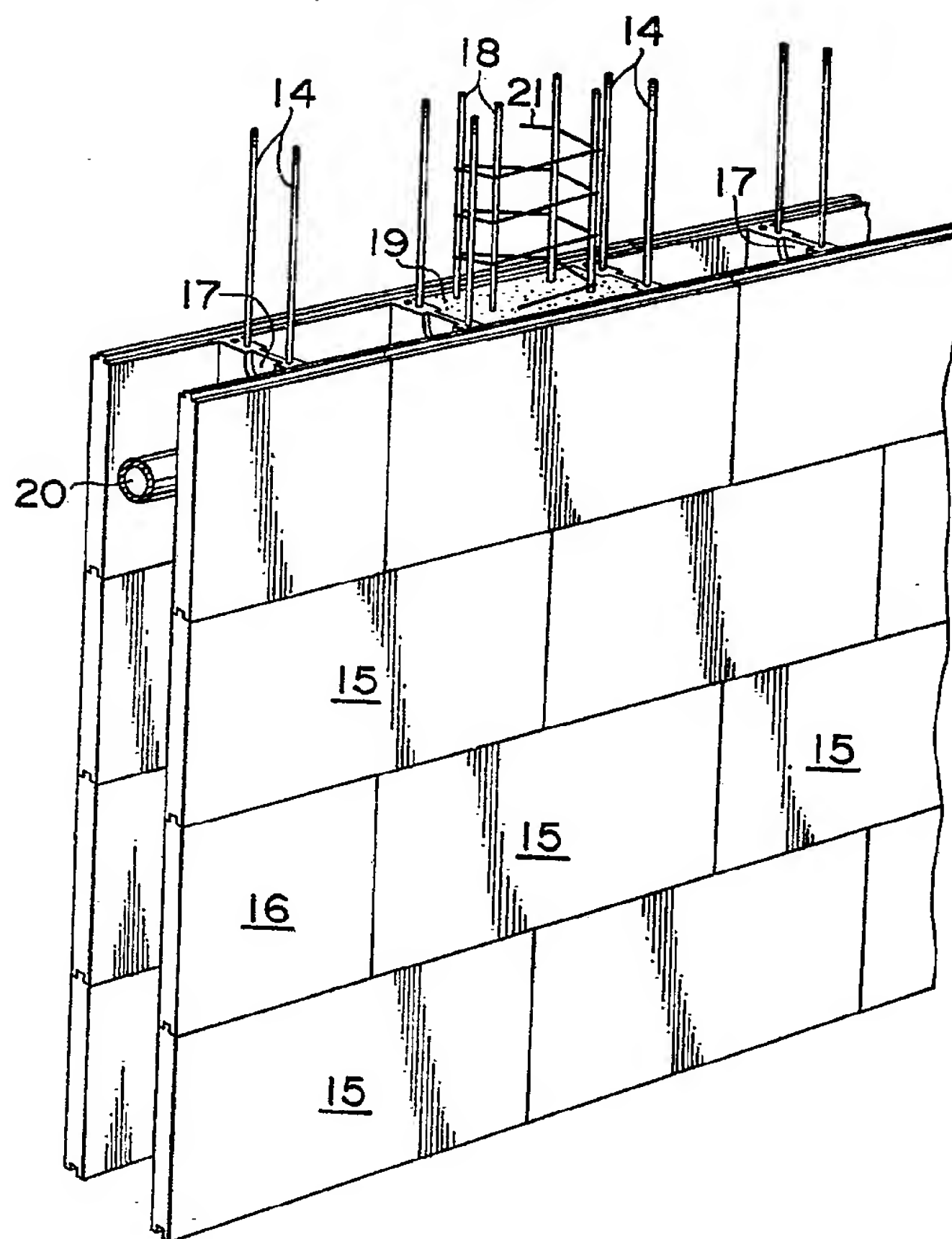


FIG. 12





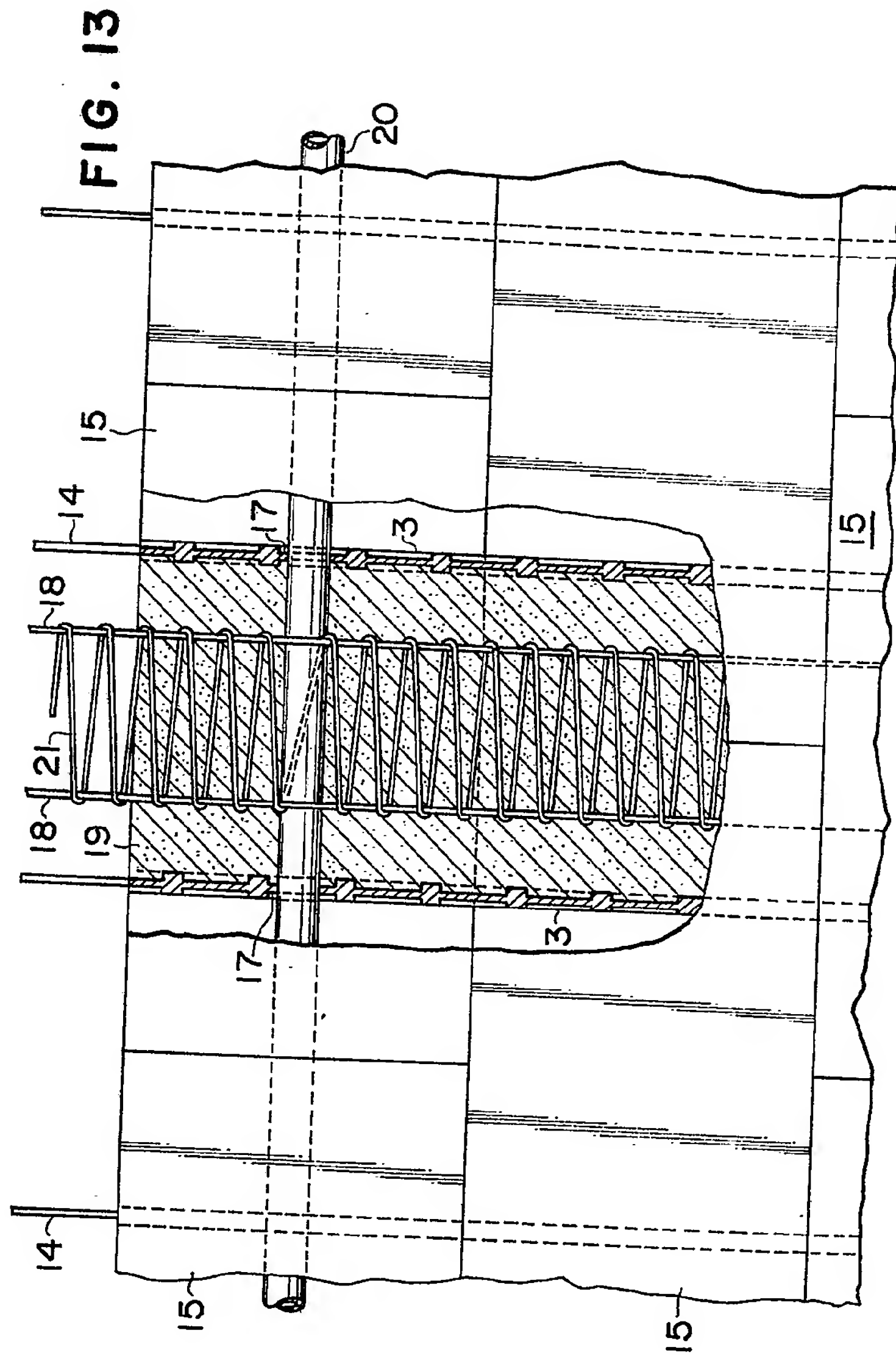


FIG. 14

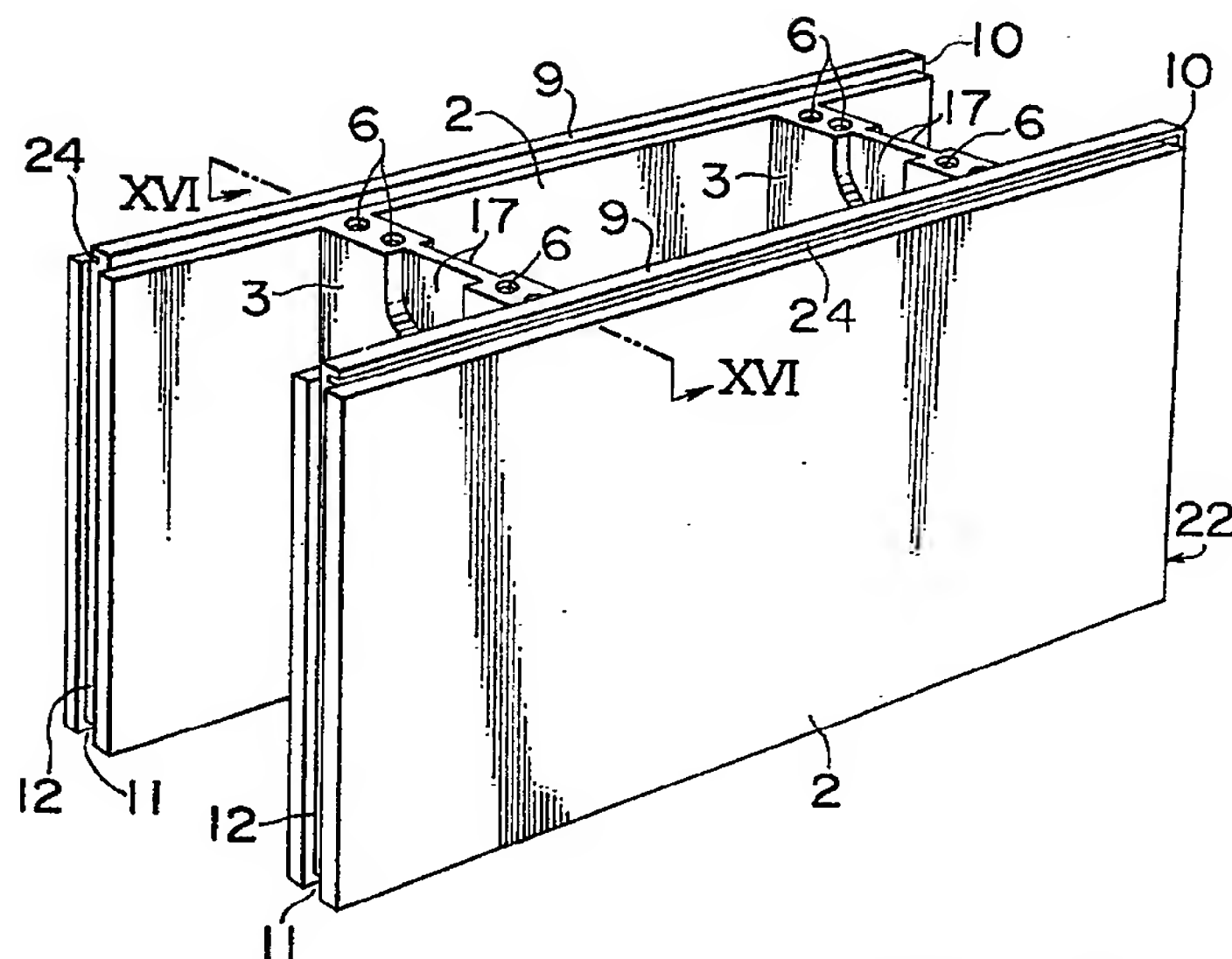


FIG. 15

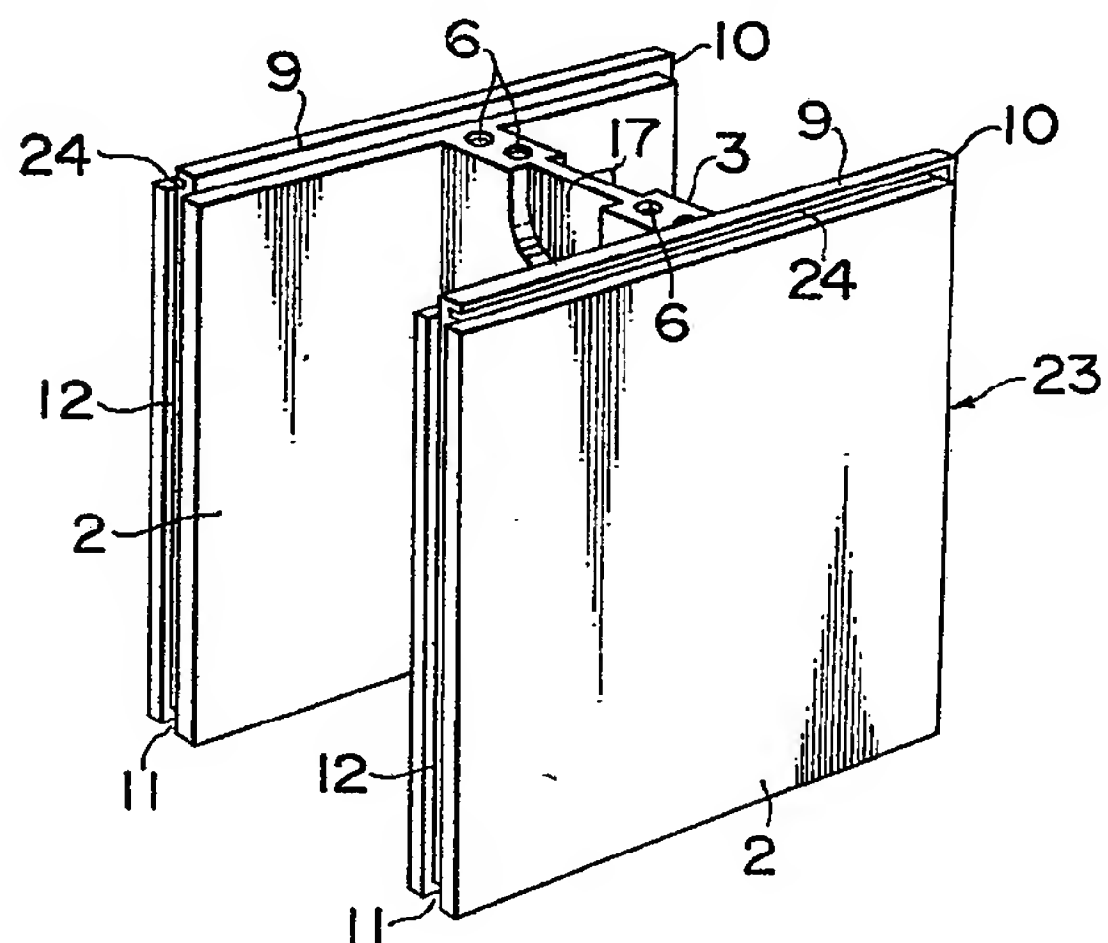


FIG. 16

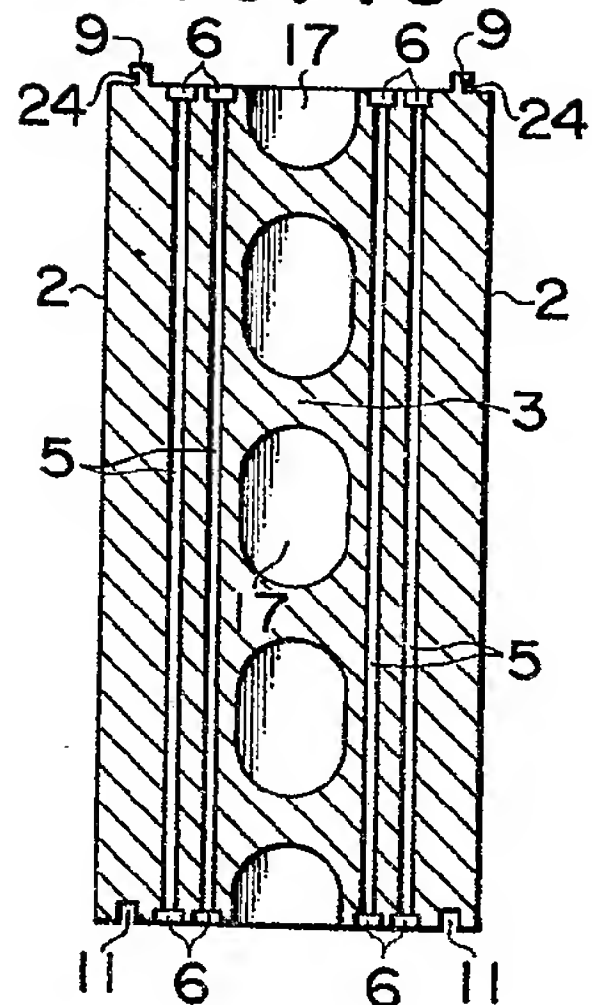


FIG. 17

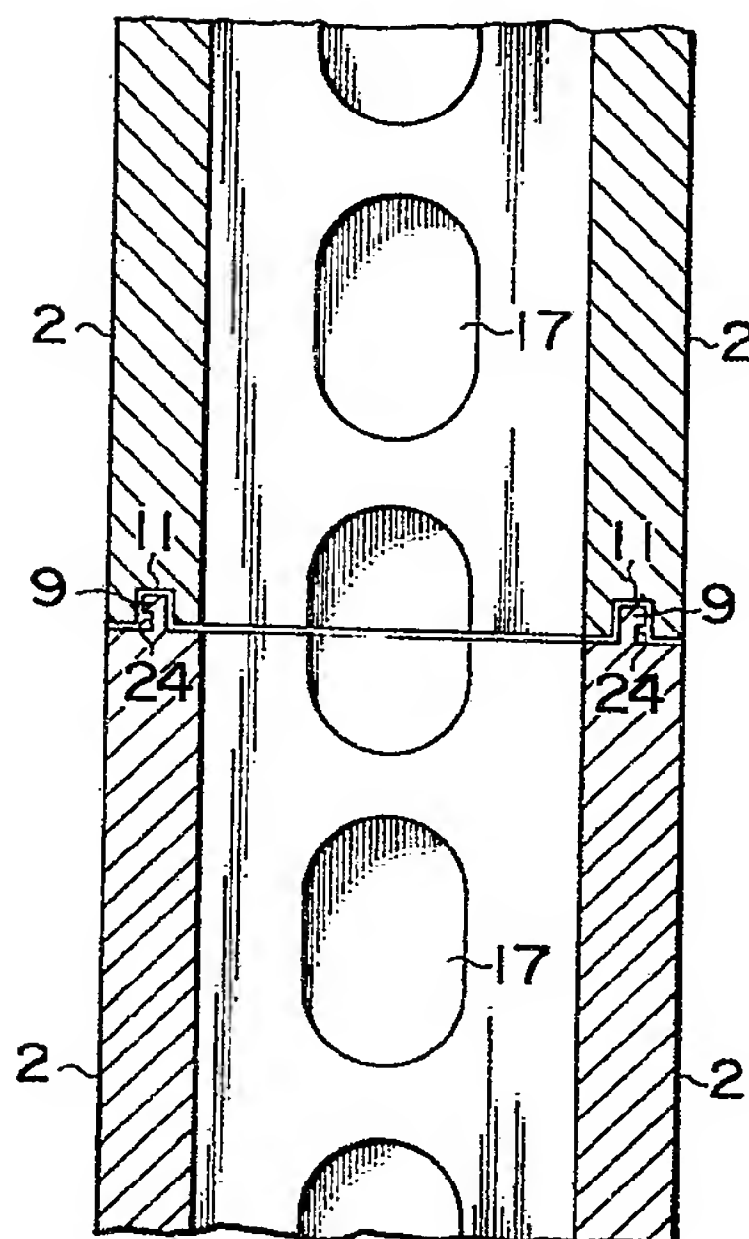


FIG. 18

